US005909464A

United States Patent [19]

Cohen et al.

[11] **Patent Number: 5,909,464**

[45] **Date of Patent: *Jun. 1, 1999**

[54] **SERIAL COMMUNICATIONS INTERFACE THAT SUPPORTS MULTIPLE INTERFACE STANDARDS**

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[73] Assignee: **Telebit Corporation**, Cupertino, Calif.

[*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: **08/901,907**

[22] Filed: **Jul. 29, 1997**

Related U.S. Application Data

[63] Continuation of application No. 08/198,448, Feb. 18, 1994, Pat. No. 5,737,364.

[51] **Int. Cl.**[6] **H04Q 11/04**; H04B 1/38

[52] **U.S. Cl.** **375/220**; 370/354; 333/25; 375/257

[58] **Field of Search** .... 375/220, 219, 375/257, 377; 370/354, 351, 360, 438, 439, 443, 487, 537; 395/741, 500, 682; 364/810, 710.08; 333/24 R, 25, 19

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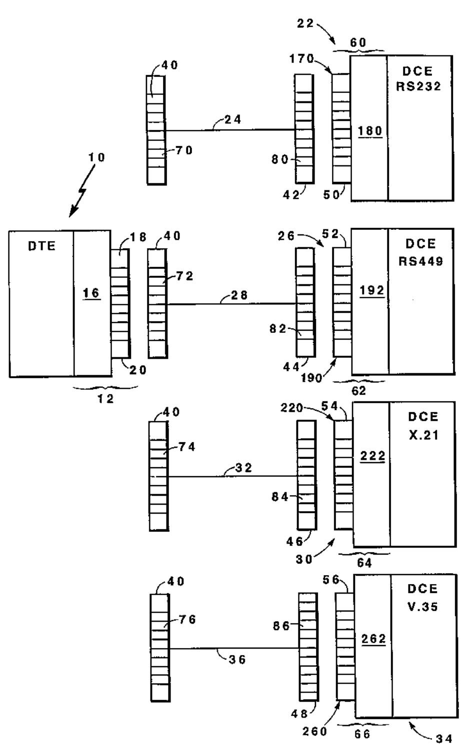
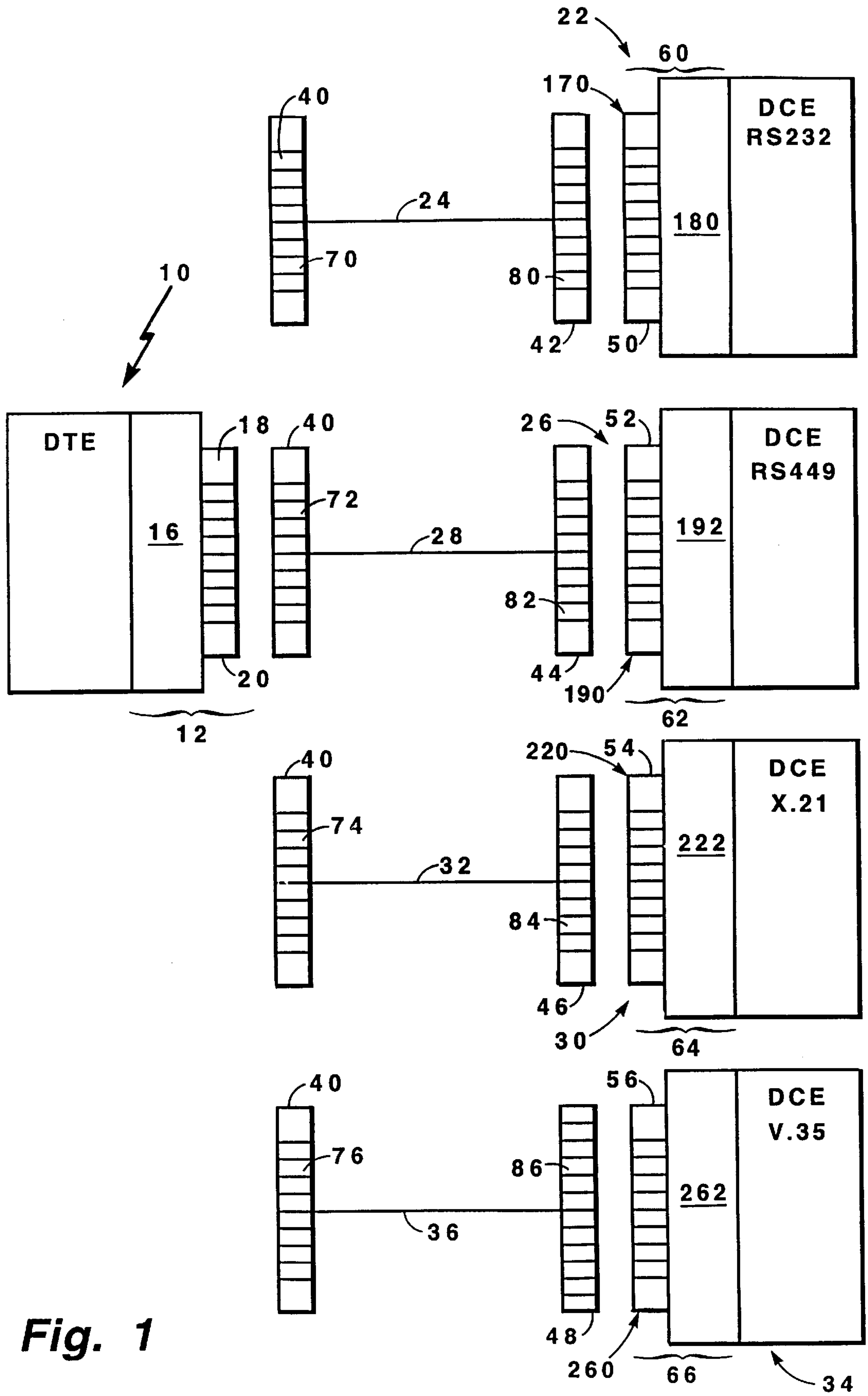
[57] **ABSTRACT**

An interface for connecting data-terminal-equipment (DTE) to a range of data-communication-equipment (DCE) using a multiplicity of interface standards is provided. The interface includes a DTE panel connector and a plurality of line drivers and receivers and associated electronics to select predetermined ones of the plurality of receivers and drivers for use by the DTE when cables having a predetermined configuration, corresponding to the supported interface standards, are attached. The cables connect the appropriate drivers and receivers of the DTE with the corresponding receivers and drivers, respectively, of the DCE. Additionally the cables also contain termination devices and a selection mechanism to select which drivers and receivers are to be used by the DTE to communicate with the receivers and drivers, respectively, being used by the DCE.

18 Claims, 7 Drawing Sheets





22
60
170
40
DCE
RS232
24
180
10
70
80
42
50
DTE
18
40
26
52
DCE
RS449
16
72
28
192
82
20
44
190
62
12
40
220
54
DCE
X.21
74
222
32
84
46
30
64
40
56
DCE
V.35
76
86
262
36
48
260
66
34

Fig. 1

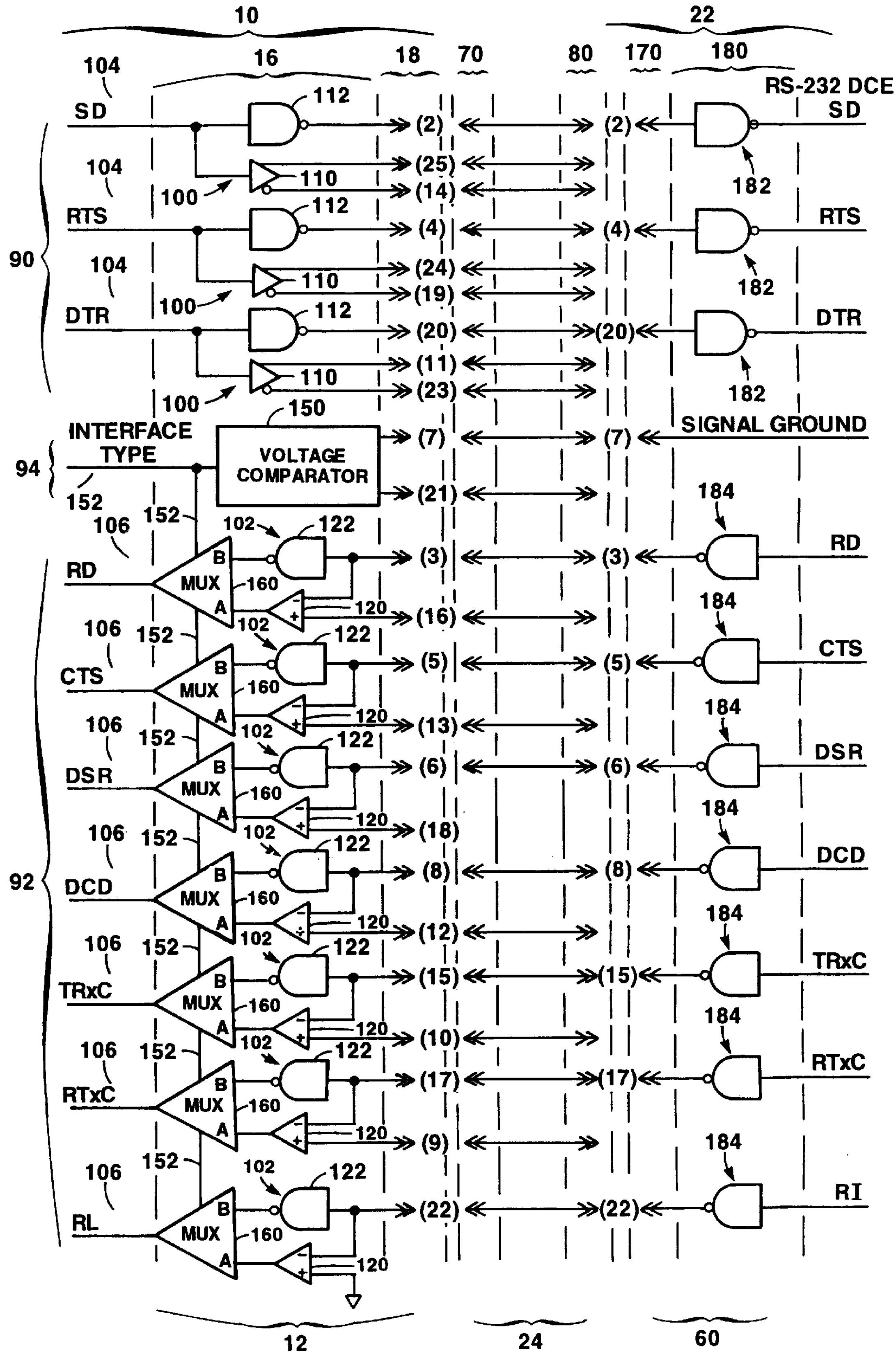

10
22
16
18
70
80
170
180
104
RS-232 DCE
SD
SD
112
182
RTS
RTS
DTR
DTR
110
100
90
150
INTERFACE TYPE
SIGNAL GROUND
VOLTAGE COMPARATOR
94
152
106
122
102
RD
RD
MUX
160
120
184
CTS
CTS
DSR
DSR
DCD
DCD
TRxC
TRxC
RTxC
RTxC
RL
RI
92
12
24
60

Fig. 2

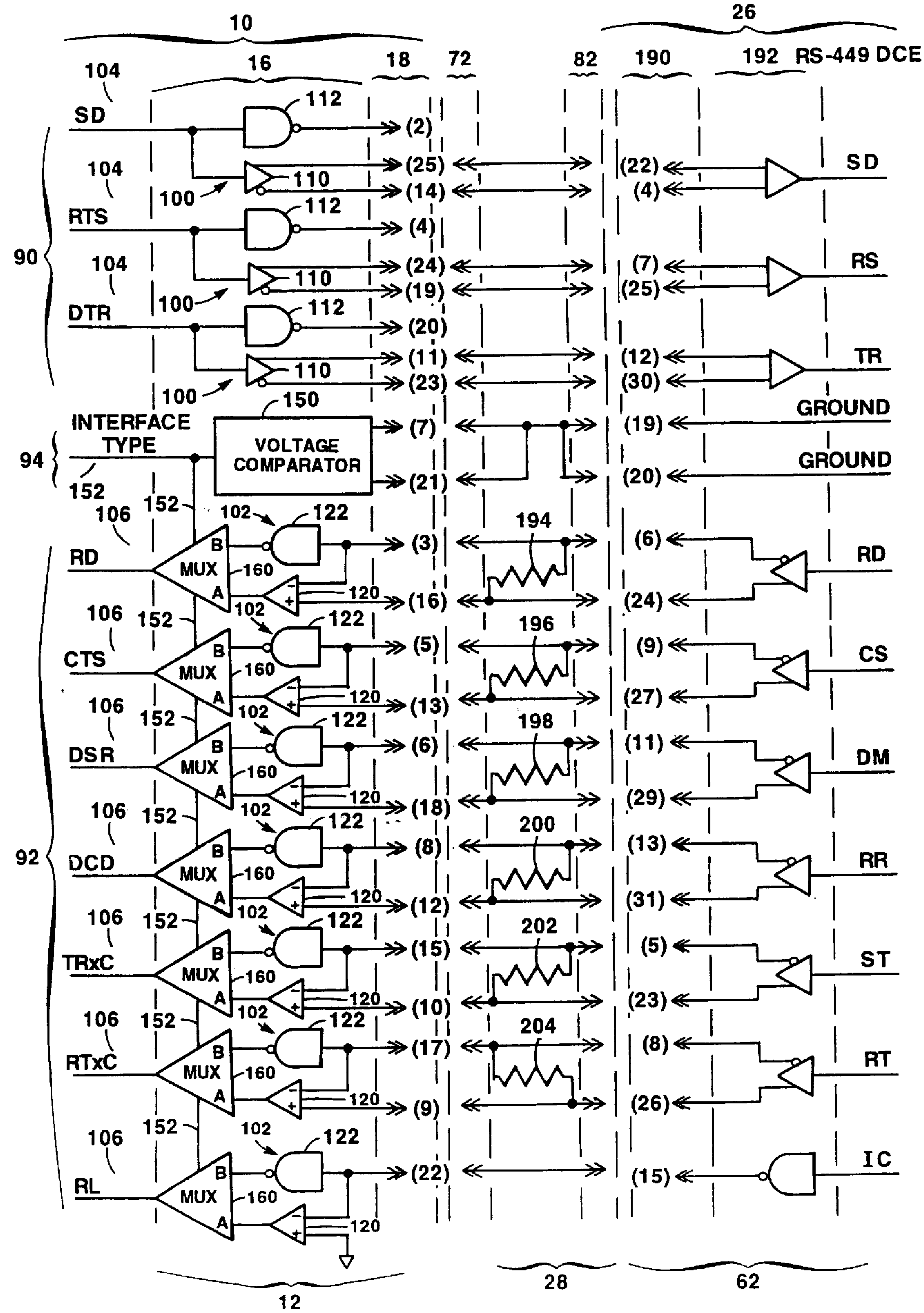

10
26
104
16
18
72
82
190
192
RS-449 DCE
SD
RTS
DTR
112
110
100
90
(2)
(25)
(14)
(4)
(24)
(19)
(20)
(11)
(23)
(22)
(4)
(7)
(25)
(12)
(30)
SD
RS
TR
150
INTERFACE TYPE
94
152
VOLTAGE COMPARATOR
(7)
(21)
(19)
(20)
GROUND
GROUND
106
RD
CTS
DSR
DCD
TRxC
RTxC
RL
MUX
B
A
102
122
160
120
92
(3)
(16)
(5)
(13)
(6)
(18)
(8)
(12)
(15)
(10)
(17)
(9)
(22)
194
196
198
200
202
204
(6)
(24)
(9)
(27)
(11)
(29)
(13)
(31)
(5)
(23)
(8)
(26)
(15)
RD
CS
DM
RR
ST
RT
IC
12
28
62

Fig. 3

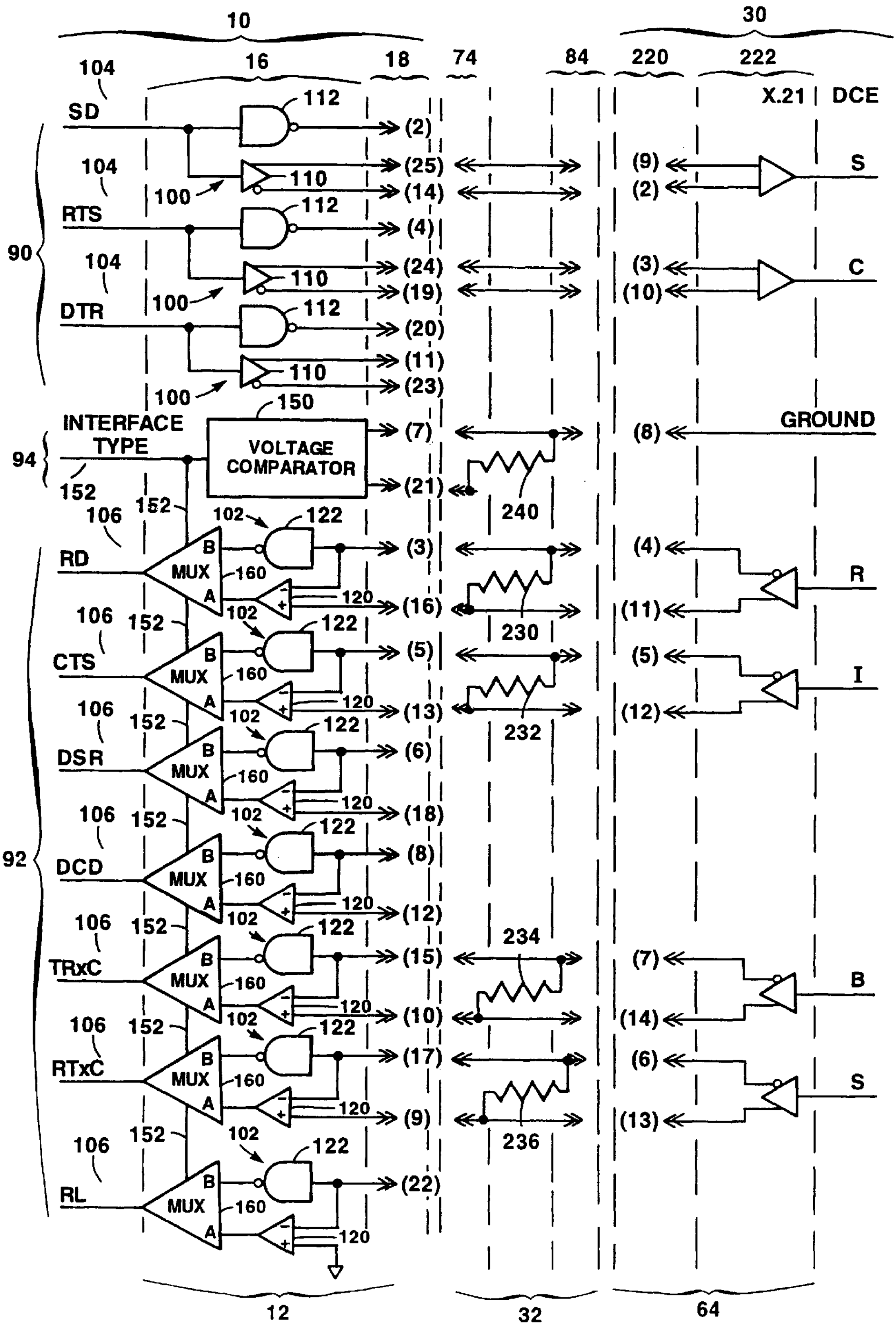

10
30
104
16
18
74
84
220
222
X.21
DCE
SD
112
(2)
104
(25)
(9)
S
100
110
(14)
(2)
RTS
112
(4)
90
104
(24)
(3)
C
100
110
(19)
(10)
DTR
112
(20)
110
(11)
100
(23)
150
INTERFACE TYPE
VOLTAGE COMPARATOR
(7)
(8)
GROUND
94
(21)
152
240
106
152
102
122
RD
MUX
B
A
160
120
(3)
(4)
R
(16)
(11)
230
CTS
(5)
(5)
I
(13)
(12)
232
DSR
(6)
(18)
92
DCD
(8)
(12)
234
TRxC
(15)
(7)
B
(10)
(14)
RTxC
(17)
(6)
S
(9)
(13)
236
RL
(22)
12
32
64

Fig. 4

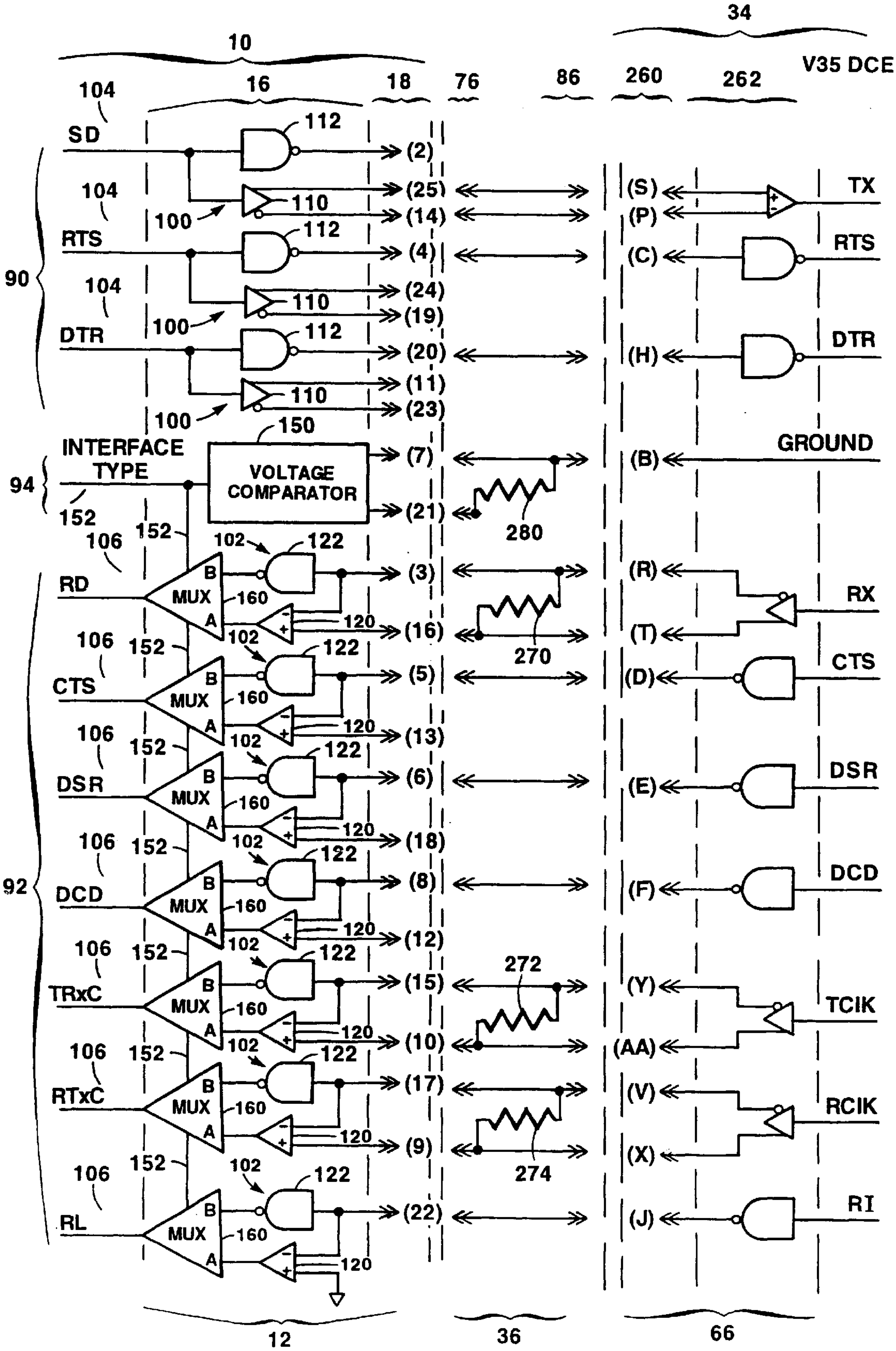

10
34
104
16
18
76
86
260
262
V35 DCE
SD
112
(2)
(25)
(S)
TX
110
(14)
(P)
100
RTS
(4)
(C)
RTS
(24)
(19)
90
DTR
(20)
(H)
DTR
(11)
(23)
150
INTERFACE TYPE
VOLTAGE COMPARATOR
(7)
(B)
GROUND
94
(21)
280
152
106
102
122
RD
MUX
B
A
160
120
(3)
(R)
RX
(16)
(T)
270
CTS
(5)
(D)
CTS
(13)
DSR
(6)
(E)
DSR
(18)
92
DCD
(8)
(F)
DCD
(12)
272
TRxC
(15)
(Y)
TCIK
(10)
(AA)
RTxC
(17)
(V)
RCIK
(9)
(X)
274
RL
(22)
(J)
RI
12
36
66

Fig. 5

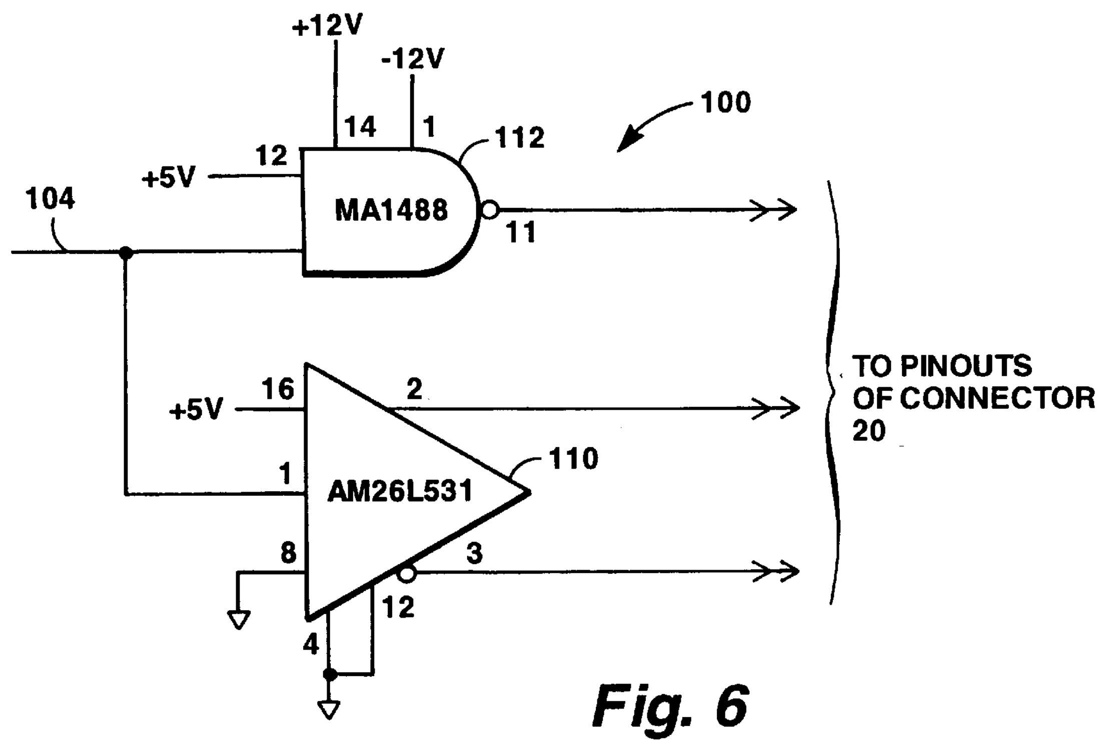

+12V
-12V
100
14
1
112
12
+5V
104
MA1488
11
TO PINOUTS OF CONNECTOR 20
+5V
16
2
110
1
AM26L531
8
3
12
4

Fig. 6

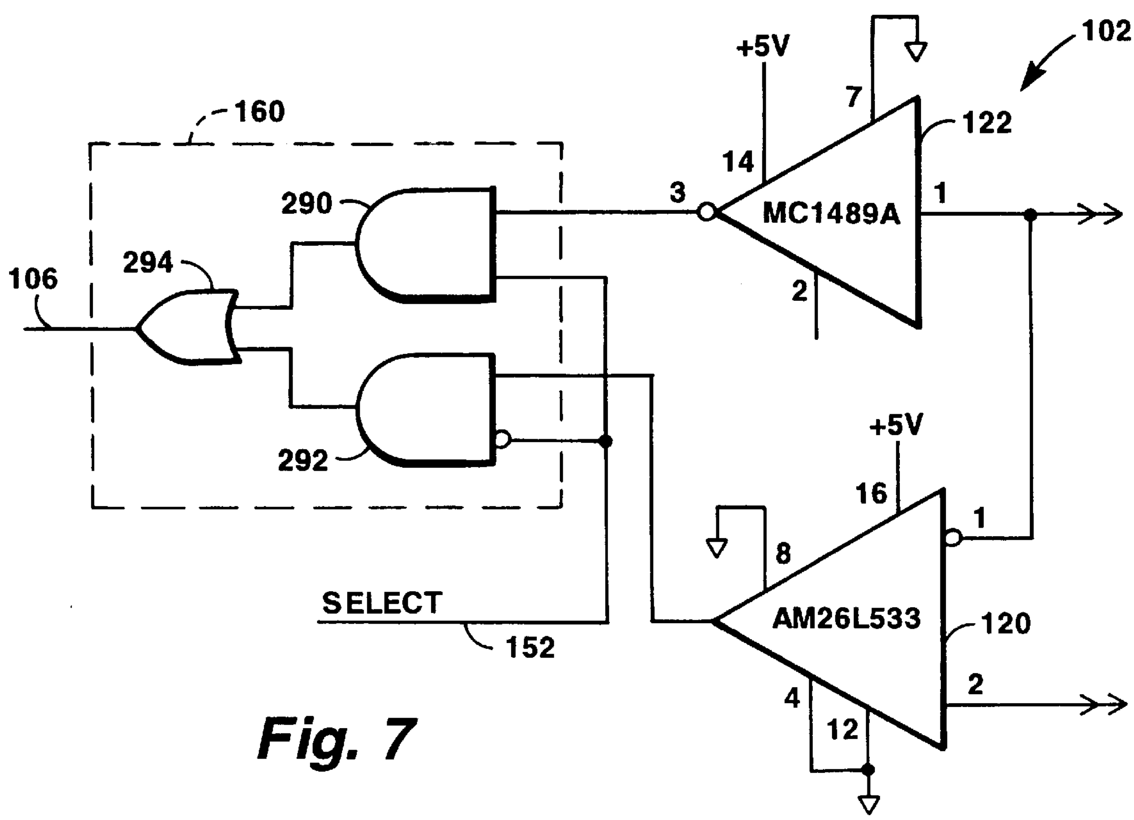

102
+5V
7
122
160
14
290
3
1
MC1489A
294
106
2
292
+5V
16
1
8
SELECT
AM26L533
120
152
2
4
12

Fig. 7

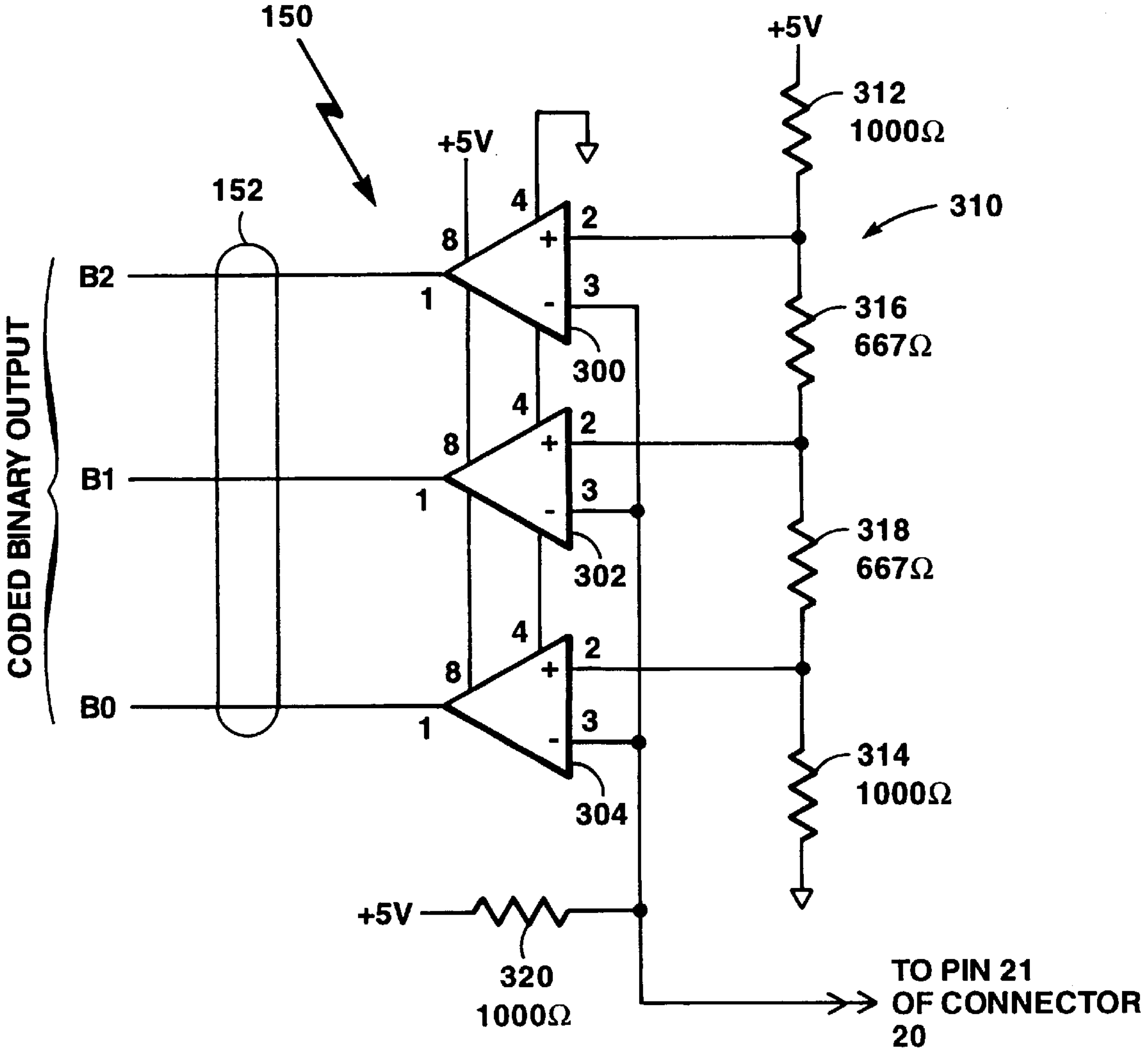

150
+5V
312
1000Ω
310
+5V
152
4
2
8
+
B2
1
3
-
300
316
667Ω
CODED BINARY OUTPUT
4
2
8
+
B1
1
3
-
302
318
667Ω
4
2
8
+
B0
1
3
-
304
314
1000Ω
+5V
320
1000Ω
TO PIN 21
OF CONNECTOR
20

Fig. 8

SERIAL COMMUNICATIONS INTERFACE THAT SUPPORTS MULTIPLE INTERFACE STANDARDS

This application is a continuation of application Ser. No. 08/198,448, filed Feb. 18, 1994, now U.S. Pat. No. 5,737, 364.

FIELD OF THE INVENTION

This invention relates generally to a digital interface apparatus for serial communication between data-terminal-equipment (DTE) and data-communications equipment (DCE) and more specifically to a digital interface apparatus for interfacing a DTE to a DCE employing any one of a number of communications interface standards.

BACKGROUND OF THE INVENTION

Both the Electronic Industries Association (EIA) and the International Telegraph and Telephone Consultative Committee (CCITT, also called ITU) have established engineering standards to facilitate the interconnection of equipment used for the serial transmission of digital data. These standards specify mechanical characteristics, electrical characteristics, and protocols for digital data exchange. There are many different standards used to interconnect DTEs and DCEs. Some of these standards are used world-wide while others are regional.

The standards discussed herein can be divided into two general classes of communications interfaces: single-ended, unbalanced, common return digital interfaces, and balanced, differential digital interfaces. The EIA RS-232 standard specifies a single-ended, unbalanced interface generally limited to transmission rates of up to 20,000 bits per second over a 50 foot cable. The EIA RS-449 standard and CCITT standard X.21 provide a balanced differential interface that is capable of transmission rates of up to 10,000,000 bits per second over a 25 foot cable. The CCITT V.35 standard is an older type of interface that uses a mixture of balanced, differential signals and single-ended unbalanced signals, and is limited to transmission rates of up to 64,000 bits per second over a 50 foot cable.

With the multiplicity of interface standards in use it is difficult to design DTEs that will interconnect with the wide range of available DCEs. Most existing DTE interconnection devices Support a single type of interface. Typically, different interface standards are accommodated by requiring the user to interchange internal circuit boards or components.

Several attempts have been made to develop a DTE interface that will support multiple standards. However these DTE interfaces require the user to switch internal circuit connections or add adapter circuit modules to accommodate to a different interface standard. An example of this type of interface is described in the Sealevel Systems Model 4013 Communications Board Functional Specification and User Manual (Sealevel Systems, Liberty, N.C.).

One DTE board supporting multiple standards is disclosed in U.S. Pat. No. 4,403,111 (the '111 patent) to Kelly. This patent discloses a DTE interface that permits the DTE to provide the EIA RS-232 interface, the EIA RS-449 interface, and a proprietary interface, which is a derivative of the EIA RS-449 standard, using only a single 25 pin connector. However, the DTE interface disclosed in the '111 patent omitted some critical signals and hence did not fully implement the applicable standards. In addition this device failed to present the required termination impedance to the connected DCE. Further the DTE interface disclosed in the '111 patent was not capable of accommodating more than 2 different communications standards due to pin limitations in the interface connector.

The present invention relates to a DTE interface is desired that will interconnect with a range of different DCE's using different interface standards, without requiring that the user take special actions to permit the interface to properly function.

SUMMARY OF THE INVENTION

The invention relates to a communications interface for connecting data-terminal-equipment (DTE) to a range of data-communication-equipment (DCE) using a multiplicity of interface standards. The DTE interface includes a panel connector, a plurality of line drivers and receivers and associated electronics to select which of the plurality of receivers and drivers are to be used by the DTE in communicating with the DCE using the proper interface standard. The selection is made by connecting a cable, which has an identification mechanism corresponding to the supported interface standard, to the DTE panel connector.

The cable connects the correct drivers and receivers of the DTE with the corresponding receivers and drivers, respectively, of the DCE according to the applicable standard and also provides line termination devices as required by the applicable standard.

BRIEF DESCRIPTION OF THE DRAWING

This invention is pointed out with particularity in the appended claims. The above and further advantages of this invention may be better understood by referring to the following description taken in conjunction with the accompanying drawing, in which:

FIG. **1** shows a block diagram of an embodiment of a system using the presently disclosed interface to connect a DTE to different types of DCE devices using different interface standards;

FIG. **2** shows an embodiment of the presently disclosed interface using the default EIA standard RS-232 interface and cable;

FIG. **3** shows an embodiment of the presently disclosed interface using the EIA standard RS-449 interface and cable;

FIG. **4** shows an embodiment of the presently disclosed interface using the CCITT standard X.21 interface and cable;

FIG. **5** shows an embodiment of the presently disclosed interface using the CCITT standard V.35 interface and cable;

FIG. **6** shows a schematic diagram of an embodiment of a DTE driver pair used in the presently disclosed interface;

FIG. **7** shows a schematic diagram of an embodiment of a receiver used in the presently disclosed interface; and

FIG. **8** shows a schematic diagram of an embodiment of a voltage comparator of the presently disclosed interface used to determine the interface type.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In brief overview, FIG. **1** is a block diagram of an embodiment of a DTE **10** having a DTE interface apparatus **12** and cable to communicate with a DCE **22**, **26**, **30**, **34** using any one of a number of predetermined communications protocols. The DTE interface apparatus **12** includes interface electronics **16** in electrical communication with the contacts **18** of a single DTE mechanical connector **20**. In the illustrative embodiment, the DTE interface apparatus **12** is capable of being connected to DCEs **22, 26, 30, 34** utilizing four different interface standards: an EIA RS-232 standard device **22** using cable assembly **24**, EIA RS-449 standard device **26** using cable assembly **28**, CCITT X.21 standard device **30** using cable assembly **32**, and CCITT V.35 standard device **34** using cable assembly **36**.

All four cable assemblies **24, 28, 32** and **36** incorporate a twenty five pin mechanical connector **40** on one end to mate with the twenty five pin panel connector **20** of the DTE interface apparatus **12**. Each cable **24, 28, 32, 36** includes an appropriate standard defined connector **42, 44, 46, 48** on its other end to mate with the panel connector **50, 52, 54, 56** of the respective DCE interface **60, 62, 64, 66** of the respective DCE **22, 26, 30, 34**. Each cable assembly **24, 28, 32, 36** is wired so as to connect the appropriate contacts **70, 72, 74, 76** of the twenty five pin mechanical connector **40** of the DTE side of the cable to the corresponding contacts **80, 82, 84, 86** of the appropriate standard defined connector **42, 44, 46, 48** of the DCE side of the cable.

Considering the DTE interface **12** in more detail, FIG. **2** depicts an embodiment of the signal drivers **90**, receivers **92**, and selection circuitry **94** used by the DTE interface electronics **16**. A pair of drivers **100** and a pair of receivers **102** is shown for each signal **104** transmitted by or each signal **106** received by the DTE **10**. Each output signal **104** from the DTE **10** is an input signal to a differential driver **110** and a single-ended driver **112** which drive different contacts **18** in the panel connector **20**. Each input signal **106** to the DTE **10** is received from one of a pair of receivers **102**. A signal received from the DCE **22** is an input signal to a differential input pair of a balanced differential receiver **120**. The negative side of the input pair also is an input signal to a single-ended receiver **122**. Both the drivers and receivers will be explained in further detail below.

The DTE interface electronics **16** also includes a voltage comparator circuit **150** the output of which is a coded binary signal on a multiwire bus **152** in electrical communication to a plurality of output multiplexers (MUX) **160**. The coded binary signal is also provided to the DTE **10**. Each of the output multiplexers **160** is used to select which of single ended receivers **122** or balanced differential receivers **120** will be used to transmit the received signals **106** to the DTE **10**. The comparator circuit **150** will be explained in detail below.

FIG. **2** further depicts the interconnection of the embodiment of the DTE interface **12** to a representative EIA RS-232 standard DCE **22**. The DTE interface **12** using the contacts **18** for the panel connector **20** is coupled to a twenty five conductor cable assembly **24** via mating connector **40** having contacts **70**. The contact assignments for contacts **70** correspond to the contact assignments for contacts **18**. The contact assignments for contacts **70** of the mechanical connector **40** are shown with corresponding numbers for the contact assignments for contacts **18** of the panel connector **20** indicated in parenthesis ( ).

The other end of the twenty five conductor cable assembly **24** includes a twenty five contact mechanical connector **42** having contacts **80**. The contact assignments for contacts **80** correspond to the contact assignments for contacts **170** of the panel connector **50** of the DCE interface **60**. The DCE interface **60** is a standard RS-232 interface and is shown with corresponding numbers for the contact assignments for contacts **170** of the panel connector **50** indicated in parenthesis ( ). These contact assignments insure the appropriate connection of the drivers **100** and receivers **102** of the DTE interface electronics **16** to the receivers **182** and drivers **184** of the DCE RS-232 interface electronics **180**.

The cable assembly **24** contains no electrical termination components. The "interface selection" contact of the DTE interface **12** in position **(21)** of the contacts **18** has no connection and thus supplies no load impedance to the DTE interface electronics **16**. This is interpreted by the voltage comparator **150** as selecting the single-ended drivers **112** and receivers **122**. This type of cable assembly **24** is an RS-232 standard cable that is readily available from many vendors. Since no impedance corresponds to the selection of the RS-232 protocol and since this will result from using an RS-232 cable, the RS-232 is the default interface. The DTE interface electronics **16** implements an EIA RS-232 standard primary synchronous/asynchronous serial communications channel when the default interface is selected.

FIG. **3** shows an embodiment of the interconnection of the present invention to an EIA RS-449 standard interface DCE **26**. The DTE interface **12** utilizes the same configuration of interface electronics **16** and contact assignments for contacts **18** of the panel connector **20** as described with respect to FIG. **2**. The panel connector **20** is coupled to a twenty five conductor cable assembly **28** with the wiring depicted. The contact assignments for contacts **72** of the mechanical connector **40** are shown with corresponding numbers for the contact assignments for contacts **18** of the panel connector **20** indicated in parenthesis ( ).

The other end of the twenty five conductor cable assembly **28** is connected to a thirty seven contact mechanical connector **44** having contact assignments for contacts **82** which correspond to the contact assignments for contacts **190**. of the panel connector **52** of the DCE interface **62**. The DCE interface **62** is an RS-449 standard interface and is shown with corresponding numbers for the contact assignments for contacts **190** of the panel connector **52** indicated in parenthesis ( ). These contact assignments provide the appropriate connection to the receivers and drivers of the DCE RS-449 interface electronics **192**.

The cable assembly **28** contains six termination resistors **194, 196, 198, 200, 202, 204** each having a value of one hundred twenty ohms, as required by the RS-449 standard. The "interface selection" contact of the DTE interface **12** in position **(21)** of the contacts **18** is connected to signal ground at position **(7)** of the contacts **18**. This presents a very low load impedance to the voltage comparator **150** of the DTE interface electronics **16**. The voltage comparator **150**, in response to the low impedance, selects the differential drivers **110** and receivers **120** to send signals from and receive signals to the DTE **10** and identifies this as an RS-449 interconnect.

FIG. **4** shows an embodiment of the interconnection of the present invention to a CCITT X.21 standard interface DCE **30**. Again, the DTE interface **12** utilizes the same configuration of interface electronics **16** and contact assignments for contacts **18** of the panel connector **20** as described with respect to FIG. **2**. The panel connector **20** is coupled to a thirteen conductor cable assembly **32** with the wiring depicted. The contact assignments for contacts **74** of the mechanical connector **40** are shown with corresponding numbers for the contact assignments for contacts **18** of the panel connector **20** indicated in parenthesis ( ).

The other end of the thirteen conductor cable assembly **32** is connected to a fifteen contact mechanical connector **46** which has contact assignments for contacts **84** which correspond to the contact assignments for contacts **220** of the panel connector **54** of the DCE interface **64**. The DCE interface **64** is a CCITT X.21 standard interface and is shown with corresponding numbers for the contact assignments for contacts **220** of the panel connector **54** indicated in parenthesis ( ). This contact **220** assignments provide the appropriate connection between the receivers and drivers of DTE interface electronics **16** and the DCE X.21 interface electronics **222**.

The cable assembly **32** contains four termination resistors **230, 232, 234, 236** each having a value of one hundred and twenty ohms, as required by the X.21 standard. The "interface selection" contact of the DTE interface **12** in position **(21)** of the contacts **18** is connected to signal ground at position **(7)** of the contacts **18** through a 667 ohm resistive load **240**. In response to this value of resistive load, the voltage comparator **150** of the DTE interface electronics **16** selects the differential drivers **110** and receivers **120** to send signals from and receive signals to the DTE **10** and identifies this as an X.21 interconnect.

FIG. **5** shows an embodiment of the interconnection of the present invention to a CCITT V.35 standard interface DCE **34**. Again, the DTE interface **12** utilizes the same configuration of interface electronics **16** and contact assignments for contacts **18** of the panel connector **20** as described with respect to FIG. **2**. The panel connector **20** is coupled to a fifteen conductor cable assembly **36** with the wiring depicted. The contact assignments for contacts **76** of the mechanical connector **40** are shown with corresponding numbers for the contact assignments for contacts **18** of the panel connector **20** indicated in parenthesis ( ).

The other end of the fifteen conductor cable assembly **36** is connected to a thirty five contact mechanical connector **48** which has contact assignments for contacts **86** which correspond to the contact assignments for contacts **260** of the panel connector **56** of the DCE interface **66**. The DCE interface **66** is a standard CCITT V.35 interface and is shown with corresponding letters for the contact assignments for contacts **260** of the panel connector **56** indicated in parenthesis ( ). These contact assignments provide the appropriate connection between the drivers and receivers of the DTE interface **16** and the receivers and drivers of the DCE V.35 interface electronics **262**.

The cable assembly **36** contains three termination resistors **270, 272, 274** each having a value of one hundred and twenty ohms, as required by the V.35 standard. The "interface selection" contact of the DTE interface **12** in position **(21)** of the contacts **18** is connected to signal ground at position **(7)** of the contacts **18** through a 1500 ohm resistive load **280**. In response to this high value of resistive load, the voltage comparator **150** of the DTE interface electronics **16** selects the differential drivers **110** and receivers **120** to send and receive signals to the DTE **10** and identifies this as an V.35 interconnect.

The exact designation and usage assignment of each contact **18** within the twenty five position DTE panel connector **20** is given in Table **1**. The signal names given in Table **1** are the common usage names for these signals as given in the standards specification for each DCE interface. Unused contacts for a particular interface standard are marked "Unused". The method for sharing positions within the twenty five contact panel connector **20** can readily be seen from Table **1**.

FIG. **6** shows an embodiment of a signal driver pair **100** for one output signal from a DTE **10**. This circuitry is repeated for all output signals of the DTE **10**. In this embodiment, the single-ended driver **112** is a Motorola MC1488 Quad Line driver, while the differential driver **110** is a Motorola AM26LS31 Differential Quad Line driver. The TTL signal **104** from the DTE **10** is the input signal to both line drivers **110, 112**. The VCC+ input of the single ended driver **112** (pin **14**) is connected to a +12 volt supply and the VCC-input (pin **1**) is connected to a −12 volt supply. The VCC input of the differential driver **110** (pin **16**) is connected to a +5 volt supply and the GND input (pin **8**) is connected to ground. The enable inputs (pins **4** and **12**) of the differential driver **110** are also connected to ground. The output signals from both drivers **110, 112** are transmitted to the DCE through the appropriate contacts **18** of the twenty five contact panel connector **20** as shown in FIGS. **2–5**.

FIG. **7** shows an embodiment of a signal receiver pair **102** and multiplexer **160** for one input signal to DTE **10**. This circuitry is repeated for all inputs of the DTE **10**. The single-ended receiver **122** of the receiver pair **102** is the Motorola MC1489A Quad Line Receiver, while the differential receiver **120** is the Motorola AM26LS33 Differential Quad Line Receiver. The differential input signal pair from panel connector **20** is the positive input signal to the receiver **120** (pin **2**), with the negative input signal as applied to (pin **1**) also sent to the input (pin **1**) of the single ended receiver **122**. The VCC input of the single-ended receiver **122** (pin **14**) is connected to the +5 volt supply and the GND input (pin **7**) is connected to ground. The VCC input of the differential receiver **120** (pin **16**) is connected to the +5 volt supply and the GND input (pin **8**) is connected to ground. The enable inputs (pins **4** and **12**) of the differential receiver **120** are also connected to ground.

The output from each receiver **120, 122** is an input to a 2-1 multiplexer **160** implemented with programmable array logic (PAL). An embodiment of the multiplexer using two symbolic AND logic functions **290, 292** and one symbolic OR logic function **294** is depicted. The multiplexer **160** select input is supplied as a coded binary input from the voltage comparator **150** by a multiwire bus **152** as discussed below.

FIG. **8** shows an embodiment of the voltage comparator **150** used in the interface. The voltage comparator **150** receives its input from (pin **21**) of the panel connector **20**. This embodiment of voltage comparator **150** uses three Motorola LM111N integrated circuit voltage comparators **300, 302** and **304**. The VCC+ input (pin **8**) of each comparator **300, 302** and **304** is connected to the +5 voltage supply, while the VCC− input (pin **4**) is connected to ground.

A voltage divider network **310** is composed of two resistors of value 1000 ohms **312, 314** and two 667 ohm resistors **316, 318** connected in series between a +5 volt supply and ground. The positive input terminals (pin **2**) of each of the comparators **300, 302, 304** are connected to the nodes of the divider network **310** as shown. This configuration establishes a reference voltage of 3.5V at (pin **2**) of comparator **300**, a reference voltage of 2.5V at (pin **2**) of comparator **302**, and a reference voltage of 1.5V at (pin **2**) of comparator **304**. The negative input terminals (pin **3**) of all three comparators **300, 302, 304** are directly connected to the interface selection contact, (pin **21**), of the twenty five pin panel connector **20**, and to one terminal of 1000 ohm resistor **320**. The other terminal of resistor **320** is connected to the +5 voltage supply.

The value of the load resistors **240** and **280** in cables **32** and **36** which are connected between contact **21** and contact **7** of panel connector **20** when cables **32** and **36** are attached creates a second voltage divider that supplies an input voltage to the negative side (pin **3**) of the comparators **300,**

302 and **304**. Table **2** shows the resistive load in the cable, the select voltage, and the binary output for each of the four interface types.

The voltage comparator **150** generates a coded binary output (B**0**, B**1**, B**2**) on a multiwire bus **152** that specifies type of DCE device currently interconnected with the DTE **10**. Column **4** in table **2** specifies the binary output for each interface type. This binary output is decoded by the PAL implementation of the 2-1 multiplexer **160** on each DTE input signal **106** to select the proper receiver type (single ended **122** or differential **120**) required for a particular interface standard. Table **3** shows the type of receiver selected for each of the four interface types.

Although the invention has been explained with reference to a number of standard interfaces, the invention may be constructed with additional signal generators and receivers and different cable designs to implement a DTE to DCE interconnect for another type of standard, e.g. EIA standard EIA-530, or EIA standard EIA-485. A different implementation could also use different pin assignments within the DTE mechanical connector, or different sharing of signal wires without altering the fundamental innovation discussed above. It is also possible, by using a DTE connector with a larger number of pins, to associate combinations of non-signal pins with various interface standards.

Having shown the preferred embodiment, those skilled in the art will realize many variations are possible which will still be within the scope and spirit of the claimed invention. Therefore, it is the intention to limit the invention only as indicated by the scope of the following claims.

What is claimed is:

1. A communications system for supporting a plurality of communications standards between DTE and DCE, said communications system comprising:

a DTE interface, said DTE interface comprising:

a first connector;

first and second receivers, said first and second receivers each having at least one input terminal in electrical communication with said first connector, said first and second receivers each having an output terminal; and

a selection circuit having at least one control terminal in electrical communication with said first connector, an output terminal in electrical communication with DTE, a first input terminal in electrical communication with said output terminal of said first receiver, and a second input terminal in electrical communication with said output terminal of said second receiver; and

a DTE interface cable assembly, said DTE interface cable assembly comprising a second connector for mating with said first connector, said DTE interface cable assembly also comprising an identification device in electrical communication with said second connector,

said identification device operative to provide at least one respective signal to said at least one control terminal through said first and second connectors for identifying which of said plurality of communications standards is supported by said DTE interface cable assembly,

said selection circuit operative to electrically connect the output terminal of either said first receiver or said second receiver to said output terminal of said selection circuit in response to said at least one respective signal provided to said at least one control terminal.

2. The communications system as defined in claim **1**, wherein said first receiver is a balanced differential receiver and said second receiver is a single-ended receiver.

3. The communications system as defined in claim **1**, wherein said selection circuit comprises a multiplexer.

4. The communications system as defined in claim **1**, wherein said selection circuit comprises a voltage comparator.

5. The communications system as defined in claim **1**, wherein said identification device comprises a resistor in electrical communication with said second connector.

6. The communications system as defined in claim **1**, wherein said identification device comprises a wire in electrical communication with said second connector.

7. A communications interface for supporting a plurality of communications standards between DTE and DCE, said communications interface comprising:

a connector;

interface electronics comprising first and second receivers, said first and second receivers each having an output terminal, said first and second receivers each having at least one input terminal in electrical communication with said connector; and

a selection circuit having at least one control terminal in electrical communication with said connector, an output terminal in electrical communication with DTE, a first input terminal in electrical communication with said output terminal of said first receiver, and a second input terminal in electrical communication with said output terminal of said second receiver;

said selection circuit operative to electrically connect the output terminal of either said first receiver or said second receiver to said output terminal of said selection circuit in response to at least one respective signal applied to said at least one control terminal.

8. The communications interface as defined in claim **7**, wherein said first receiver is a balanced differential receiver and said second receiver is a single-ended receiver.

9. The communications interface as defined in claim **7**, wherein said selection circuit comprises a multiplexer.

10. The communications interface as defined in claim **7**, wherein said selection circuit comprises a voltage comparator.

11. The communications interface as defined in claim **7**, wherein said identification device comprises a resistor in electrical communication with said second connector.

12. The communications interface as defined in claim **7**, wherein said identification device comprises a wire in electrical communication with said second connector.

13. A cable assembly for supporting a plurality of communications standards between DTE and DCE, said cable assembly comprising:

a cable connector for mating with a panel connector of a DTE interface; and

an identification device in electrical communication with said cable connector,

said identification device operative to provide at least one signal to identify which of a plurality of communications standards is supported by said cable assembly, said identification device providing said at least one signal to at least one respective control terminal of a selection circuit of said DTE interface through said cable connector and said panel connector,

said selection circuit comprising an output terminal in electrical communication with DTE, a first input terminal in electrical communication with an output terminal of a first receiver of said DTE interface, and a second input terminal in electrical communication with an output terminal of a second receiver of said DTE interface;

said selection circuit operative to electrically connect the output of either said first receiver or said second receiver to the output of said selection circuit in response to said at least one signal provided to said at least one respective control terminal.

14. The cable assembly as defined in claim **13**, wherein said first receiver is a balanced differential receiver and said second receiver is a single-ended receiver.

15. The cable assembly as defined in claim **13**, wherein said selection circuit comprises a multiplexer.

16. The cable assembly as defined in claim **13**, wherein said selection circuit comprises a voltage comparator.

17. The cable assembly as defined in claim **13**, wherein said identification device comprises a resistor in electrical communication with said cable connector.

18. The cable assembly as defined in claim **13**, wherein said identification device comprises a wire in electrical communication with said cable connector.

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